

WHAT IS CLAIMED IS:

1. An image forming method, which comprises:
 - two or more toner image forming processes comprising at least an electrifying step of electrifying the surface of a latent image-carrier;
 - a latent image forming step of forming a latent image on the surface of the electrified latent image-carrier; and
 - a developing step of forming a toner image by developing the latent image formed on the surface of the latent image-carrier with an electrostatic image developer, which is stored in a developing device and contains a toner and a carrier,
- wherein in at least one of the two or more toner image forming processes, the developing step is performed while appropriately supplying a supplementary developer containing a toner and a carrier to a developing device, and collecting excess electrostatic image developer that appears in the developing device due to the supplying of the supplementary developer,
- and an image is formed on a transfer receiving material via at least a toner image overlaying step of successively overlaying a toner image formed by each of the two or more toner image forming processes,
- and an average circularity of a toner contained in at least the supplementary developer is in the range of 0.940 to 0.980; a ratio of the number of particles having an average circularity of 0.970 or greater, in a particle diameter range of a toner circle-equivalent diameter $\times 3/5$ or less,

is 5% or less; and a ratio of the number of particles having an average circularity of 0.950 or less, in a particle diameter range of a toner circle-equivalent diameter $\times 7/5$ or greater, is 10% or less.

2. An image forming method according to claim 1, wherein an unused developer is stored in the developing device, and an average circularity of a toner contained in the unused developer is in the range of 0.940 to 0.980; a ratio of the number of particles having an average circularity of 0.970 or greater, in a particle diameter range of a toner circle-equivalent diameter $\times 3/5$ or less, is 5% or less; and a ratio of the number of particles having an average circularity of 0.950 or less, in a particle diameter range of a toner circle-equivalent diameter $\times 7/5$ or greater, is 10% or less.

3. An image forming method according to claim 1, wherein a volume average particle diameter of a toner contained in the supplementary developer is in the range of 3 to 10 μm ; a volume average particle size distribution index GSD (v) is 1.25 or less; a number average particle size distribution index GSD (p) is 1.25 or less; and a lower side number average particle diameter distribution index GSD (punder) is 1.27 or less.

4. An image forming method according to claim 1, wherein at least fine inorganic particles are added to the surface of the toner contained in the supplementary developer; a flowability index (compression ratio) G1 of the toner having fine inorganic particles added to the surface thereof is in the range of 0.32 to 0.45; and a ratio of the flowability index (compression ratio) G1 relative to a flowability index (compression ratio) G2 ($G1/G2$)

after the toner having fine inorganic particles is mixed with fine magnetic metal particles, the surfaces of which are covered with an organic layer, and the mixture is stirred at an angular frequency of 30rad/s or more for 60 minutes, is 0.63 or more.

5. An image forming method according to claim 1, wherein a dielectric constant ϵ' of a toner contained in the supplementary developer is in the range of 1.0 to 2.7, and a dielectric loss tangent $\tan \delta$ of the toner is in the range of 0.002 to 0.018.

6. An image forming method according to claim 1, wherein the toner contained in at least the supplementary developer contains a releasing agent, and an exposure rate of the releasing agent on the toner surface quantified by X-ray photoelectron spectrometry (XPS) is in the range of 11 to 40 atm%.

7. An image forming method according to claim 1, wherein image formation is performed at a constant process speed, which is swichable.

8. An image forming method according to claim 1, wherein the electrifying step is performed using a roll electrifying type electrifying equipment.

9. An image forming method according to claim 1, comprising a cleaning step for cleaning the surface of the latent image-carrier.

10. An image forming method according to claim 1, wherein the toner contained in the supplementary developer is produced by a wet process.

11. An image forming method according to claim 10, wherein the wet process comprises

a first aggregating step of adding an aggregating agent to a mixture, which is obtained by mixing a first resin fine particle dispersion, in which first resin fine particles having an average particle diameter of 1 μm or less are dispersed, a colorant dispersion, a releasing agent dispersion, and a dispersion in which fine inorganic particles are dispersed, so as to form core aggregated particles in the mixture;

a second aggregating step of forming a surface layer containing second resin fine particles on the surface of the core aggregated particles using a second resin fine particle dispersion in which the second resin fine particles are dispersed, to prepare core/shell-type aggregated particles; and

a fusing and coalescing step of fusing and coalescing the core/shell-type aggregated particles by heating the core/shell-type aggregated particles to a temperature higher than the glass transition temperatures of the first resin fine particles and the second resin fine particles.

12. An image forming method according to claim 10, wherein the aggregating agent comprises at least an aluminum compound containing aluminum ions, and the amount of the aluminum compound to be added relative to the total weight of toner-constituting solid matter contained in the mixture is in the range of 0.1 to 2.7% by weight.

13. An image forming method according to claim 1, wherein in all of the two or more toner image forming processes, the developing step of each toner image forming process is performed while appropriately supplying a supplementary developer containing a toner and a carrier to a

developing device, and collecting excess electrostatic image developer that appears in the developing device due to the supplying of the supplementary developer.

14. An image forming apparatus which comprises at least:

two or more developing units provided with at least a latent image-carrier, an electrifying means for electrifying the surface of the latent image-carrier, latent image forming means for forming a latent image on the surface of the electrified latent image-carrier, and a developing device for storing an electrostatic image developer containing a toner and a carrier, wherein the developing device develops the latent image formed on the surface of the latent image-carrier with the electrostatic image developer, so as to form a toner image; and

a toner image overlaying means for successively overlaying a toner image, which is formed by each of the two or more developing units, onto a transfer receiving material,

wherein at least one of the two or more developing units is provided with at least a developer supplying means for appropriately supplying a supplementary developer containing a toner and a carrier to a developing device, and a developer collecting means for collecting excess electrostatic image developer that appears in the developing device due to the supplying of the supplementary developer, and

an average circularity of a toner contained in at least the supplementary developer is in the range of 0.940 to 0.980; a ratio of the number of particles having an average circularity of 0.970 or greater, in a particle diameter range of a toner circle-equivalent diameter $\times 3/5$ or less,

is 5% or less; and a ratio of the number of the particles having an average circularity of 0.950 or less, in a particle diameter range of a toner circle-equivalent diameter $\times 7/5$ or greater, is 10% or less.

15. An image forming apparatus according to claim 14, wherein all of the two or more developing units are provided with the developer collecting means.

16. An image forming apparatus according to claim 14, wherein an unused developer is stored in the developing device in the two or more developing units; an average circularity of a toner contained in the unused developer is in the range of 0.940 to 0.980; a ratio of the number of particles having an average circularity of 0.970 or greater, in a particle diameter range of a toner circle-equivalent diameter $\times 3/5$ or less, is 5% or less; and a ratio of the number of particles having an average circularity of 0.950 or less, in a particle diameter range of a toner circle-equivalent diameter $\times 7/5$ or greater, is 10% or less.

17. A toner cartridge that is detachable from an image forming apparatus and which stores a supplementary developer containing a toner in which an average circularity is in the range of 0.940 to 0.980; a ratio of the number of particles having an average circularity of 0.970 or greater, in a particle diameter range of a toner circle-equivalent diameter $\times 3/5$ or less, is 5% or less; and a ratio of the number of particles having an average circularity of 0.950 or less, in a particle diameter range of a toner circle-equivalent diameter $\times 7/5$ or greater, is 10% or less.

18. A toner cartridge used in an image forming apparatus, comprising at least:

two or more developing units provided with at least a latent image-carrier, an electrifying means for electrifying the surface of the latent image-carrier, latent image forming means for forming a latent image on the surface of the electrified latent image-carrier, and a developing device for storing an electrostatic image developer containing a toner and a carrier, wherein the developing device develops the latent image formed on the surface of the latent image-carrier with the electrostatic image developer, so as to form a toner image; and

a toner image overlaying means for successively overlaying a toner image, which is formed by each of the two or more developing units, onto a transfer receiving material,

wherein at least one of the two or more developing units is provided with at least a toner cartridge for storing a supplementary developer containing a toner and a carrier, and appropriately supplying the supplementary developer to a developing device; and a developer collecting means for collecting excess electrostatic image developer that appears in the developing device due to the supplying of the supplementary developer, and

an average circularity of a toner contained in a supplementary developer stored in the toner cartridge is in the range of 0.940 to 0.980; a ratio of the number of particles having an average circularity of 0.970 or greater, in a particle diameter range of a toner circle-equivalent diameter $\times 3/5$ or less, is 5% or less; and a ratio of the number of particles having an average circularity of 0.950 or less, in a particle diameter range of a toner circle-equivalent diameter $\times 7/5$ or greater, is 10% or less.